Docket R-3605-2006

BEFORE THE RÉGIE DE L'ÉNERGIE DU QUÉBEC

GRAND COUNCIL OF THE CREES

DIRECT TESTIMONY OF ROBERT MCCULLOUGH

OCTOBER 2, 2006

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I. INTRODUCTION AND PURPOSE

Q. Please state your name, title and address for the record.

A. My name is Robert McCullough. I am the Managing Partner of McCullough Research, an energy consulting firm specializing in bulk power issues. My address is 6123 S.E. Reed College Place, Portland, Oregon, 97202. My vita is Attachment A to this testimony.

Q. Can you provide a brief summary of your qualifications?

A. Yes. I have been active in US and Canadian energy issues for over twenty-five years. In Quebec, I have worked for Alcan and Abitibi as well as the Grand Council of the Crees since the late 1980s. I have participated in several project development negotiations in Quebec over the years including those among the Manicouagan and La Grande River valleys. I have testified extensively before the U.S. Congress, legislative committees, state and federal courts, and regulatory commissions. My testimony before the U.S. Senate Energy and Natural Resources Committee in 2002 is credited with initiating the investigations into Enron's trading practices. My current clients include industries, utilities, and governments across North America. My vita is included as Attachment A to this testimony.

Q. What is the purpose of your testimony?

A. The Grand Council of the Crees has asked me to make recommendations designed to facilitate construction of wind energy projects in their communities on the east coast of James and Hudson Bay.

Q. Please summarize your recommendations.

A. My testimony recommends that the transmission tariff be amended to include language based on recent FERC proceedings to streamline wind power and renewables development. The critical question of the "export fee" should use the model developed at the California Independent System Operator. Finally, I would recommend priority for

short term transmission access with an opportunity cost adjustment to make Hydro-Quebec whole, in order to avoid losing wind output during peak hours.

Q. How is your testimony organized?

A. My testimony is organized in five sections. Immediately after this introduction, I begin with a general discussion of economic efficiency and Hydro-Quebec's participation in the reciprocity policy of the U.S. Federal Energy Regulatory Commission (FERC). The third section discusses rules recently adopted by FERC which would be useful if also adopted by the Reggie. Fourth, I discuss the ongoing Participating Intermittent Resource Program (PIRP) underway in California. Finally, I discuss proposed, but not yet filed, U.S. federal legislation being developed by US Senator Ronald Wyden of Oregon which would standardize and promote renewables across the United States.

Q. Please summarize your testimony.

A. Renewables, specifically wind, have become economically attractive over the past few years. Unfortunately, since the electric system has traditionally favored utility-developed central generating stations, smaller renewable projects encounter several institutional challenges that prevent their implementation. At FERC and the California Independent System Operator (CAISO), initiatives are underway to streamline the implementation process. Hydro-Quebec, as part of its marketing program in the U.S., has adopted the reciprocity policy implemented by FERC. This policy exchanges open access to the Quebec grid for open access in the United States. I suggest that the facilitation of similar policies in both areas is both desirable and consistent with current policies.

Q. Has the policy development elsewhere in North America reached completion?

A. Not yet. The resolution of the "export fee" for renewables in California has just recently reached a stage where it will be presented to FERC for approval.

Q. Why is this issue applicable to a transmission proceeding?

A. The major implementation problems for wind projects – specifically smaller, community-based wind projects – concerns generation interconnection and transmission issues. An efficient way to address them is to adopt specific transmission tariff language.

II. ECONOMIC EFFICIENCY AND PUBLIC POLICY

Q. Why is the promotion of renewable resources, such as wind, a beneficial public policy for Quebec?

A. The best possible policy for the development of energy resources is to be guided by the market. With increasing prices for fossil fuels – especially natural gas and oil – alternatives that cost less and have favorable long term qualities should be encouraged throughout North America. Unlike other energy resources, renewables are, by definition, long-lived projects whose output can be sold into wider markets even if their output is not immediately required in Quebec.

Q. Why is it suitable to discuss renewables in the context of transmission?

A. Transmission to the market is often a primary consideration for renewables. Since renewables are generally based on a resource that depends on a specific location with specific characteristics, it is usually quite likely that the resource will be located far from "demand" (load centers, which tend to be large metropolitan areas). This is particularly true for the province of Quebec.

Q. How do we bring markets to renewable resources?

A. Given that markets, like loads, are generally quite distant from both community-based and industry-sized wind projects, we must assure the developers of a renewable resource that they can indeed reach markets.

Q. Is it true that the renewable resource might not actually be used in a distant market?

A. Absolutely. The importance of the market is to set economically efficient prices for the resource. As with all other transactions in the electricity industry, the actual electron flows are determined by physics, not by contracts.

Q. Why would Quebec want to bring relatively high prices from New England and New York markets, for example, to wind projects on James and Hudson Bay?

A. Renewable resources, like wind, do not get "used up." Thus, accelerated development simply makes Quebec more profitable by selling renewable energy in excess of requirements in high-priced American and Ontario markets.

Q. Could Hydro-Quebec choose to buy the output of small wind projects and use it for domestic use or export?

A. Yes. In fact, given the proximity of the wind projects to existing hydroelectric dams, this might well be the best use. However, the availability of market prices would allow a simple standard of value to allocate the risks and benefits of the project development. Absent access to the market, valuation becomes the zero-sum negotiation that has often characterized attempts to do business with Hydro-Quebec.

Q. How would you characterize the current situation for renewable resource developers in Quebec?

A. I believe Hydro-Quebec answered this question itself in its first response to the Grand Council of the Crees:

> 1. Provide the total maximum capacity of the TransÉnergie electricity transportation networks from the James Bay Territory available for the purposes of wind energy production, with the detailed methodology used to determine such available capacity.
>
> R1: The answer to this question requires an impact study which the Conveyor can carry out within the framework of a request for connection of power station carried out under the terms of the article 12A of the Tariffs and Conditions or of a request for service of transport of point-to-point under the terms of article 17 or of a request of the Distributor for an invitation to tender for the purchase of electricity under the terms of article 40.5 of the Tariffs and conditions. Taking into account the list of the impact studies in progress currently

> for purposes mentioned above, it is impossible to answer differently this question than by such a request.[1]

Q. What does this answer mean?

A. Resource development in Quebec often requires an extensive, adversarial negotiation to reach completion. For example, if I were a developer facing such a response, I would remove my investment from Quebec and pursue opportunities in areas with interconnection procedures similar to those adopted in FERC proceedings RM02-12 or RM05-04.

Q. Is requiring an adverse zero-sum negotiation for small wind projects economically efficient?

A. No. As noted above, the loser in this negotiation is the province of Quebec. Even for smaller projects, lengthy negotiations, interconnection policy debates, and impact studies are simply a deadweight loss. In effect, Hydro-Quebec's unwillingness to adopt a streamlined interconnection policy is a tariff levied on Quebec by Quebecers. In the end, discouraging renewables is bad business and bad environmental policy. It also sends a message to the electricity industry in North America that the province of Quebec is not "open."

Q. What is your recommendation to the Régie?

A. The Régie should direct Hydro-Quebec to adopt a simple policy – modeled on existing policies at FERC – for the interconnection and export of wind projects and add the policy to Hydro-Quebec's open access tariff.

Q. Is it inappropriate for Hydro-Quebec to use recent FERC orders establishing standardized transmission tariff language as a model?

A. No. In fact, I recommend that Hydro-Quebec should modify the FERC orders to make wind interconnection an even easier and faster process. Ignoring or dismissing extensive

[1] HQT-13, Document 6, page 3.

policy development efforts elsewhere in North America will cost the province of Quebec as it tries to play "catch-up."

Q. Is the export fee calculation developed in California appropriate for Quebec?

A. Yes, but with two straightforward changes. The balancing energy calculations should reflect Quebec's hydroelectric base, and a special charge pertaining only to the state of California should be removed.

III. DOCKETS RM02-12 AND RMO5-4-000 AT THE U.S. FEDERAL ENERGY REGULATORY COMMISSION

Q. Has FERC taken an interest in the open access treatment of wind?

A. Yes. FERC has three proceedings that reflect solutions for wind resources. The first two, RM02-12 and RM05-04, have proceeded to final orders. The last proceeding. AD04-13, has been combined with a general proceeding to review the status of FERC's pivotal 888 order. It is not expected that this latter proceeding will lead to a quick resolution of outstanding issues in AD04-13.

Q. Please describe RM02-12.

A. RM02-12 is entitled, "Standardization of Small Generator Interconnection Agreements and Procedures." The preamble to the final rule states:

> This Final Rule requires all public utilities to adopt standard rules for interconnecting new sources of electricity no larger than 20 megawatts (MW). It continues the process begun in Order No. 2003 of standardizing the terms and conditions of interconnection service for Interconnection Customers of all sizes. It will reduce interconnection time and costs for Interconnection Customers and Transmission Providers, preserve reliability, increase energy supply, lower wholesale prices for customers by increasing the number and types of new generation that will compete in the wholesale electricity market, facilitate development of non-polluting alternative energy sources, and help remedy undue discrimination, as sections 205 and 206 of the FPA require. Public utilities must amend their open access transmission tariffs (OATTs) to include a Small Generator Interconnection Procedures document (SGIP – Appendix E to this Preamble) and a Small Generator Interconnection Agreement (SGIA – Appendix F to this Preamble).[2]

Q. What basic issues does the final order in RM02-12 address?

A. The final order sets out the procedures for interconnection (Small Generator Interconnection Procedures or SGIP) and the interconnection agreement (Small Generator Interconnection Agreement or SGIA.) The SGIP is the roadmap for

[2] Order No. 2006 Final Rule, issued May 12, 2005, pages 1 through 3.

interconnection and the SGIA is the agreement between the developer and the transmission provider. Among the issues that the SGIP addresses are voltage level, certification, expedited procedures, queuing, scoping, and interconnection studies. The SGIA addresses contract issues including metering to testing, termination, credit support, billing, insurance, and liability.

Q. Does RM02-12 deliver what this strong preamble delivers?

A. Yes. RM02-12 sets out an explicit set of rules and regulations covering interconnection for projects less than 20 megawatts. The primary benefit of a clear set of instructions for smaller projects is that it enables developers to proceed quickly to construction without lengthy debates concerning engineering, policy and business issues. The Final Order is Attachment B of this testimony.

Q. Does Hydro-Quebec abide by this rule?

A. I can honestly say that it is not at all clear exactly what Hydro-Quebec's interconnection policies are at this juncture. I note that different data requests to Hydro-Quebec in this proceeding have received very different answers. Its response to a question concerning transmission access from the Grand Council of the Crees received a standard answer identifying different tariffs and the requirements for impact studies.[3] Its response to the RNCREQ indicates that these rules are not applicable to Hydro-Quebec's system.[4]

Q. Who bears the cost of Hydro-Quebec's apparent inability to adopt a single, detailed, and widely accepted policy?

A. Quebec and its citizens bear the cost. As wind projects are frequently small, the best possible implementation process for wind is to make the rules clear, the procedures simple, and the negotiations – if any – as short as possible. Failing this, small wind projects in Quebec will be forced to carry a large deadweight loss as every development

[3] See HQT-13, Document 6, page 3, for example.
[4] See HQT-13, Document 10, page 15, for example.

must reinvent the wheel for every interconnection. Simply stated, vehicles run better on standardized tires – building each tire one at a time gives a very bumpy ride.

Q. Describe the second interconnection order, RM05-04.

A. This is entitled, "Interconnections for Wind Energy." The preamble to this FERC order states:

> In this Final Rule, to meet our responsibility under sections 205 and 206 of the Federal Power Act (FPA) to remedy undue discrimination, the Commission adopts standard procedures and technical requirements for the interconnection of large wind plants. The Commission requires all public utilities that own, control, or operate facilities for transmitting electric energy in interstate commerce to append to the Large Generator Interconnection Procedures (LGIPs) and Large Generator Interconnection Agreements (LGIAs) in their Open Access Transmission Tariffs (OATTs) the Final Rule Appendix G adopted here. These standard technical requirements provide just and reasonable terms for the interconnection of wind plants. The rule recognizes the technical differences of wind generating technology, and benefits customers by removing unnecessary obstacles to further development of wind generating resources while ensuring that reliability is protected.[5]

Q. What basic issues does RM05-04 address?

A. RM05-04 addresses larger wind projects. Issues include low voltage "ride-through" capability – reliability issues during low voltage events, power factor, dynamic reactive power capability, and SCADA. As with RM02-12, the order provides standardized solutions designed to streamline implementation.

Q. Does RM04-05 deliver on these promises?

A. Yes. As with my answer above, the final order in RM05-04 provides a clear process for the siting of large wind projects and their interconnection to the transmission system. Again, the primary benefit is to streamline procedures and accelerate the deployment of wind generation equipment. This Final Order is Attachment C to this testimony.

Q. Is Hydro-Quebec using this rule?

[5] Interconnection for Wind Energy, issued June 2, 2005, pages 1 and 2.

A. Again, the answer appears to be no. In its answers to RNCREQ, Hydro-Quebec cited different circumstances that made application of such rules inappropriate.

Q. Is Hydro-Quebec's assertion that RM05-04 and RM02-12 are not applicable to its situation realistic?

A. Not really. The two FERC proceedings apply to a wide variety of systems, including those very similar to Hydro-Quebec, like the system in the Pacific Northwest, and those which are different, such as the Pennsylvania New Jersey Maryland interconnection (PJM). Both rules were crafted to address a broad set of circumstances. The logic of using the FERC proceedings as a model for Quebec is not simply to "copy" determinations that Canadian and U.S. policymakers crafted in Washington DC, but to provide a straightforward roadmap for renewables development in the province. If some features of the final rules are inappropriate, it is certainly within the power of Hydro-Quebec and the province to discard or improve them.

Q. Do the final orders in these two proceedings resolve all problems related to the interconnection of wind energy projects?

A. No. For example, one of the most challenging issues is the provision of ancillary services in the export of intermittent energy resources such as wind.

Q. What are ancillary services?

A. Although many facets of electric energy can be viewed as commodities, the fact is that an infrastructure of services must be erected to allow a stable market in electricity. Intermittent energy resources such as wind rely upon the system to turn intermittent supplies into marketable commodities. Although definitions of ancillary services differ, the standard definition involves dispatch, reliability, reserves, and scheduling. Without these, the commodity, electricity, would neither be reliable nor deliverable. A useful metaphor is the infrastructure for weighing and certifying truck transportation – highway

weigh stations and the like. These are also "ancillary services" required to bring products to market.

Q. Have these issues come up before the Régie in previous proceedings?

A. Yes. The RNCREQ and the UMQ filed testimony on this issue in R-3549-04 on October 18, 2005.[6] Section 7 of their report addressed an important issue currently under debate at FERC and in the Participating Intermittent Resource Program (PIRP) in California.

Q. Can you give a succinct statement of the problem?

A. Yes. It is critical for the stable operation of the electric system that scheduled generation precisely matches deliveries. In both California and Texas, relaxed standards created the potential for system instability and market manipulation.[7] FERC has established rigorous conditions to assure the precision of generation scheduling. Unfortunately, wind is an intermittent resource – energy output varies without any question of operator error or market malfeasance. The provision of additional energy to ensure precise delivery is a continuing problem.

Q. Are you referring to the large scale uncertainty of wind over weeks or months?

A. I am referring to the ability of a wind project of any size to deliver dependable power within the *hour*. While good forecasting will provide a measure of certainty, there will always be moments when the forecast is above or below the actual generation. This relatively minor adjustment of schedules to generation poses a problem to system operators who attempt to run their systems with a high degree of precision.

Q. What is the standard industry solution?

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[6] TransÉnergie's "Tarifs et conditions: comments concerning rates, discounts, interconnection costs and generation imbalance service," Philip Raphals, October 18, 2005.

[7] Two of Enron's most notorious market manipulation schemes in the Western Energy Crisis of 2000-2001 used schedules that exploited the difference between schedules and actual flows: Thin Man (schedules without energy) and Fat Boy (energy without schedules).

A. Long before discussions at FERC and at the California Independent System Operator, intermittent resources like wind were scheduled using a shaping agreement with a hydro-electric utility. In the Pacific Northwest, where such agreements were not uncommon, the intermittent resource simply exchanged its expected deliveries for assured deliveries from the utility. In effect, the hydroelectric utility was "renting" a portion of its reservoir to the intermittent resource.

Q. Is this a good solution?

A. From the viewpoint of engineering, it is an excellent solution. Obviously, not all intermittent resources are situated next to a major hydroelectric project. When they are not, alternatives must be found.

Q. Is siting wind farms only near hydroelectric systems the direction in which FERC is leaning?

A. No. Such solutions are only appropriate for regions with substantial hydroelectric resources. FERC has leaned toward filling scheduling shortfalls (and overages) in the real time balancing energy market. Several such balancing markets are currently in existence. The price of the balancing energy is determined by real time bids (usually on a ten- or fifteen-minute basis) and applied to the use of balancing energy by the intermittent resource.

Q. Is FERC near a final determination on this difficult issue?

A. No. One indication of FERC's intentions is probably indicated by a 2004 discussion paper entitled, "Assessing the State of Wind Energy in Wholesale Electricity Markets."[8] The paper states:

> An additional delivery issue for wind energy is how imbalance charges are imposed under the pro forma tariff. Imbalance charges were developed in order to ensure that generators' actual hourly output matched their scheduled amounts.

[8] FERC Staff, "Assessing the State of Wind Energy in Wholesale Electricity Markets," November 2004.

> These imbalance charges work to enhance reliability, encourage accurate scheduling and discourage gaming. However, this type of energy imbalance penalty is particularly punitive to intermittent resources, as they have greater difficulty predicting scheduled amounts and even less control over their dispatchability.
>
> Since wind is not completely unpredictable on a day-ahead basis, it is possible for some wind capacity to be scheduled on such a basis. Statistical methods can be used to commit wind energy in advance. For example, the prior day's wind or the prior hour's wind can be used to estimate the wind speed, and hence the capacity available for the next period.
>
> Centralized markets are often able to address this issue, both with respect to substituting real-time energy markets for imbalance penalties and with respect to novel tariff provisions. A potential solution outside of centralized markets is for individual transmission operators to allow generators the flexibility to schedule closer to real-time. The ability of wind generators to predict their output increases dramatically in the hour preceding the delivery hour. It is conceivable that intermittent resource schedule adjustments would represent negligible changes in overall system conditions and therefore not greatly affect system reliability.
>
> The Commission-approved California Independent System Operator (CAISO) Participating Intermittent Resources Program (PIRP) exempting wind from hourly imbalance penalties and substituting monthly netting of imbalances in return for centralized wind delivery forecasting is an example of the type of tariff reforms that could facilitate wind development. The CAISO's voluntary PIRP, was created to accommodate projected growth of wind generation attributable to California's renewable supply requirements. Under the PIRP, the CAISO forecasts and schedules wind output, and nets any imbalances over the course of a month.[9]

Later evidence of FERC's position is given by the Notice of Proposed Rulemaking (NOPR) under docket RM05-10. This NOPR presents new rules that streamline the interconnection rules for intermittent resources such as wind. The NOPR states:

> At the time Order No. 888 was issued, intermittent resources were not a significant source of generation and typically energy from intermittent resources was sold to the host utility. In the years since the issuance of Order No. 888, intermittent resources have grown at an annual average rate of approximately 20 percent and want to avail themselves of the open access transmission tariff (OATT or tariff) for opportunities to make sales more broadly, but are hesitant to do so because of the application of imbalance provisions that were designed to apply to resources with the ability to control fuel input and thus schedule their

[9] Ibid., pages 31 and 32.

> energy with precision. These imbalance provisions were not designed to apply to intermittent resources that by nature are weather-driven. In order to remove the unjust, unreasonable, unduly discriminatory or preferential imbalance tariff provisions, while still providing an incentive to intermittent resources to schedule as accurately as possible, the Commission, pursuant to its authority under sections 205 and 206 of the Federal Power Act, proposes to establish a standardized schedule under the Order No. 888 pro forma OATT to address generator imbalances created by intermittent resources and clarify the application of the current energy imbalance provision of the Order No. 888 pro forma tariff…. [10]

The NOPR goes on to state:

> The development of renewable sources of energy, including wind resources, brings benefits to energy customers by providing environmental benefits and supports increased reliability by increasing the diversity of energy supplies. Wind energy can satisfy certain federal and state-mandated programs for the development of renewable energy. On balance, however, we also recognize that there are additional costs incurred in integrating wind energy into the system and that each control area, based on its unique characteristics, will be able to accommodate different amounts of wind resources.
>
> As a remedy to the issues we have heard, we propose to establish a new generator imbalance service schedule under the pro forma OATT that would apply only to intermittent resources. In the case where a transmission provider's OATT currently includes a generator imbalance charge provision that is more lenient than the charge set forth in Schedule XYZ, we propose that the transmission provider would assess the lesser charge. Moreover, in recognition that some transmission providers assess generator imbalance charges through interconnection agreements rather than OATT provisions, we are soliciting comment on whether to require that, prospectively, any generator imbalance provisions in future interconnection agreements with intermittent generators conform to the provisions in Schedule XYZ. [11]

The proceeding in RM05-10 has not yet reached a final rule.

[10] FERC Notice of Proposed Rulemaking, "Imbalance Provisions for Intermittent Resources: Assessing the State of Wind Energy in Wholesale Energy Markets." April 14, 2005, pages 1 and 2.
[11] Ibid., pages 32-33.

Q. The 2004 FERC discussion paper mentions a program called PIRP. Was there an explicit proposal for the export of PIRP power outside of CAISO's control area tabled at the time of the discussion paper?

A. No. However, in the interim, CAISO has published a proposed policy for the export of power produced by PIRP generators which it intends to file at FERC at the end of this month. The CAISO proposal is Attachment D of this testimony.[12]

Q. Is this the so-called "export fee" issue?

A. Yes. Since local systems must provide ancillary services for intermittent energy resources, export off-system would leave the local system providing a service for which it must be remunerated. This is commonly called the "export fee."

IV. PARTICIPATING INTERMITTENT RESOURCE PROGRAM

Q: What is the Participating Intermittent Resource Program?

A: The Participating Intermittent Resource Program (PIRP) allows power generators with intermittent and uncontrollable resources, primarily wind generators, to schedule power to the grid without being penalized for delivering a different amount of power than was scheduled. By accurately forecasting generation beforehand, the Independent System Operator (ISO) can schedule power more efficiently. To enter PIRP, a generator must: pay a flat forecasting fee of $0.10 per megawatt hour, must agree to all of CAISO's terms and conditions, and must install technology to communicate with CAISO.[13] PIRP was first proposed in 2001 and became operational in 2004. PIRP is a prime example of how

[12] CAISO Proposal for Tariff Amendment for Export Fee to Address Export of Energy from Participating Intermittent Resources Program ("PIRP") Resources, California Independent System Operator, September 22, 2006.

[13] California System Operation. "PIRP FAQ's – Part 1." July 26, 2006, page 1. http://www.caiso.com/183f/183f8eb8e940.pdf

an energy market administrator can incorporate wind generation into its generation mix in a way that provides advantages to generators, consumers, and the administrator.

Q: Why is PIRP necessary?

A: Wind generators rely on a resource that is difficult, if not impossible, to forecast. Since a central power administrator (ISO) must ensure that the grid remains in balance, with load equaling generation, wind's intermittency presents a problem. PIRP allows CAISO to adhere to California's Renewable Portfolio Standard while maintaining grid stability. Using PIRP's sophisticated forecasting technology allows CAISO to schedule wind generation and reduces the need to buy or offload needed or excess energy on the spot market, thus creating vast savings.[14]

Q. How does PIRP work?

A: At 5:00 each day, True Wind Solutions, a vendor selected by CAISO, provides an hourly generation forecast for the next day. Additionally, throughout the operating day, True Wind Solutions submits hourly forecasts which allow the ISO to develop a model of how much generation will be available at any time.[15] Since the forecast allows the ISO to schedule energy more precisely, it needs to offload excess energy and buy urgently needed energy on the spot market less often. The reduced uncertainty and associated savings represent PIRP's main advantages to the California system. In return for paying the forecasting fee and buying the necessary technology to interface with True Wind Solutions, the generators are not charged the imbalance fees they normally would be liable for if they delivered a different amount of energy than they had scheduled. Instead, they pay a monthly weighted-average market clearing price charge based on the net errors over the month. This actually results in a subsidy to generators, as explained here:

[14] James Blatchford and John Zack. "California ISO's Participating Intermittent Resource Program (PIRP): Description and Results." March 28, 2004, pages 12-13.
[15] Ibid., page 4.

> The PIRP subsidy arises primarily from provisions in the CAISO Tariff that allow (1) deviations between scheduled and actual Energy generation to be netted over a SC's entire portfolio of resources, and over the month rather than over the 10-minute settlement interval, and (2) this netted billable quantity to be multiplied by a market clearing price ("MCP") that is calculated based on the average MCP over the month rather than the MCP for each 10-minuite interval. This method of settlement typically results in a shortfall of market revenue (this shortfall occurs because, as the CAISO procures Imbalance Energy on a 10-minute interval basis, actual procurement costs to manage deviations may not match the assessment on the monthly net deviations). The under- or over-recovery of these costs is allocated to other market participants through their SC based on their Net Negative Deviations through Charge Type 721. In 2005, Charge Type 721 charged to SCs was approximately $2.3 million.[16]

Q: Can PIRP generators export energy outside of CAISO's control area?

A: Yes. But due to the potential costs, wind generators are subject to an export fee. Until the implementation of the proposal, they are not subject to any fee for exporting energy. As a result, during the summer of 2006, CAISO launched an initiative to modify the tariff rules to address the export of subsidized power.[17]

Q: What is the result of this initiative?

A: As mentioned above, CAISO issued a proposed policy ten days ago. The proposal sets out two tests for the export fee:

1. Existing contracts are exempt from the export fee.
2. Exports with verifiable production within the area and verifiable loads within the area are exempt for the export fee.

All other intermittent schedules are deemed to be exported from the control area.

Q. How does CAISO plan to calculate the export fee?

A. The proposal includes a number of elements:

1. Balancing energy

[16] CAISO White Paper: Export of PIRP Energy Project. June 28, 2006, page 1.
[17] Ibid.

2. Transmission losses

3. Payment for resources operating at minimum levels

4. Forecasting fee

The following chart shows the CAISO example for the calculation:

Example of Settlement of PIRP Export Fee

Charge Type	Description	Total	Comment
CT 4487	Allocation of Excess Cost for Instructed Energy	$1,195,817	2005 CY Costs
CT 4450	Transmission Loss	$777,631	2005 CY Costs
CT 1697	MLCC Tier 1	$717,011	2005 CY Costs
	Total	$2,690,459	
CT 701	Forecasting Fee MWh (generated MWh for year)	1,285,157	2005 CY MWh
TBD	Export Fee ($/MWh)	$2.09	2006 Rate for Exports
Assume only one PIRP facility is exporting			
Assume this PIRP facility is split as follows:			
	Exporting % of PIRP Resource ID is 38.4615 %		
	Non- Exporting % of PIRP Resource ID is 61.5385 %		
Actual metered generation for that PIRP Resource ID for month 7,650 MWh			
Export Fee for Month			
	Volumetric Rate ($/MWh charge * volume in MWH)	$16,015.17	
	Portion of ISO Monthly Charge ($10,000/12)	$833.33	Only one SC exports

	Total	$16,848.51[18]

Q. Are all of these charges relevant to areas outside of California?

A. No. While balancing energy is consistent with other regions, "MLCC" is a quantity specific to the California Independent System Operator. Transmission losses and the forecasting fee would be appropriate in Quebec. Otherwise, this calculation can be adopted readily by other areas outside of California. As I note in the next section, it would not be surprising to find a similar calculation implemented in upcoming U.S. federal legislation.

Q. How should the balancing energy charges be calculated?

A. Balancing energy markets are generally regarded as a black art. The California and Texas markets, for example, are generally regarded as poor substitutes for real market transactions.[19] In a region dominated by thermal energy, thermal peaker charges – or some suitable substitute – would be appropriate. In regions dominated by hydroelectric generation, the Pacific Northwest or Quebec for example, such charges are nominal.

Q. Do you recommend the creation of a balancing energy market for Quebec?

A. No. Like the Pacific Northwest, such institutions are only required for projects distant from hydroelectric resources. For Quebec, the correct answer is a simple tariff charge. No balancing energy market is required.

V. U.S. SENATOR RONALD WYDEN'S RENEWABLES INITIATIVE

Q. Can you describe Senator Wyden's planned initiative in this area?

[18] Ibid., page 5.

[19] This past week, the media announced that the annual report (2005) of the Texas market discovered evidence of market power in a high proportion of balancing market transactions.

A. Traditionally, the Pacific Northwest has been highly supportive of renewable projects. U.S. Senator Wyden (D-Oregon) has taken a special interest in this area and has been assembling a consensus on appropriate steps to encourage the U.S. renewables industry. While his initiative has yet to be filed in Congress, it has received serious attention from the energy community.

Broadly, his concept involves three parts:

1. A formal determination of renewable status.[20]
2. A priority for access on available transmission.
3. A central verification process for determining renewable resources, contracts, and deliveries.

The second concept has relevance for Quebec. While Quebec's transmission system is fully used during on-peak periods, off-peak use has large amounts of schedulable capacity.

Q. What other issues is the proposed legislation likely to address?

A. Certification and verification are central issues in the U.S. Since the U.S. has hundreds of different systems with a variety of different ownership (state, federal, private, and public), standards are now different in every jurisdiction.

Q. Would it be likely that Senator Wyden will provide guidance on the "export fee" issue?

A. I would not expect him to be interested in this issue. As noted above, all indications are that CAISO will file its solution at FERC this month. Since FERC approval is likely, this issue will most likely be settled before Senator Wyden's bill is proposed in Congress.

Q. Why is transmission priority an issue?

[20] U.S. states differ on their definition of renewable resources. Major hydroelectric projects, for example, are not regarded as renewable in California.

A. The U.S. has a variety of methods of allocating transmission access. At the moment, schedules on most interregional transmission are allocated on a "first come/first served" basis through the OASIS system. This can provide a challenge for the export of renewable projects.

Q. Would such a provision be useful in Quebec?

A. For projects along the shores of James and Hudson Bays, priority for wind power would be beneficial for short term sales. Obviously, schedules for domestic load and long term contracts would have priority. In a scheduling competition between wind and hydroelectric spot sales, it would be best to dispatch the wind and store the water on an hour-by-hour basis, since the water can be used for future generation and the wind cannot be "saved up." Equally obviously, the beneficiary of such priority access would have to reimburse the hydroelectric system for economic losses due to rescheduled hydroelectric spot sales. This provision is a viable possibility for the province of Quebec.

Q. Can you summarize your testimony in this proceeding?

A. The Régie should add language modeled on recent policies developed elsewhere in North America in order to streamline and facilitate renewable development. Where changes representing law or engineering are appropriate, they should be adopted. There are considerable benefits from adopting such tariff language: doing so would facilitate development of small scale renewables – such as wind – and would minimize the cost of reinventing such policies on a case-by-case basis.

Q. Have such opportunity cost based transmission priority policies ever been implemented?

A. Yes. In my experience they have been quite successful. The Bonneville Power Administration implemented such arrangements in both its Long Term Intertie Access Policy and its Short Term Intertie Access Policy in the late 1980s.

Q. How are the charges calculated?

A. Short term users that displace on-peak exports reimburse the displaced user for the difference between on-peak and off-peak prices. For example, prescheduled on-peak prices for delivery in Massachusetts today (September 29, 2006) are U.S.$43.75/MWh. If a wind resource displaced 100 MWh or on-peak delivery, it would be charged an opportunity cost of the difference between the on-peak and off-peak price, U.S.$13.50 /MWh, for 100 MWh, or U.S.$1,350.00.

Q. What would be the net benefit to Quebec from such an arrangement?

A. In this case, since wind resources have no fuel cost, the benefit would be U.S.$3,250. Failing to adopt such an opportunity cost arrangement would force the wind project to go off-line if off-peak spot sales had already scheduled the entire use of the transmission lines from James Bay.

Q. Does this complete your testimony?

A. Yes.